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Recovery of retained fuel through disruptions: implications for ITER[1] BRUCE LIPSCHULTZ, ROBERT GRANETZ, JAMES IRBY, BRIAN LABOMBARD, DENNIS WHYTE, MIT Plasma Science and Fusion Center — Single discharge retention of injected gas in current tokamaks ranges from 3-50% of the injected gas raising concerns of excessive tritium retention for ITER. As part of a recent study of fuel retention in Alcator C-Mod it was found that, averaged over a run period, the fuel retained, normalized by ion fluence to divertor surfaces, was 100-1000x lower than for the same normalized retention in a single, non-disruptive discharge. Analyzing all disruptions for a run campaign it was found that the average disruption during plasma current flattop (15% of all discharges), led to fuel recovery 5-6x that retained in a single, non-disruptive discharge; Disruptions appear to remove all the fuel retained in non-disruptive discharges. Analysis of the fuel recovery dependence on disruption characteristics gave a scaling linear in plasma thermal energy and as the square of the magnetic energy. In this presentation we review the above information, discuss the role of the high-Z plasma facing components, and examine possible scalings to the use of disruptions for fuel recovery in ITER.

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Bruce Lipschultz
MIT Plasma Science and Fusion Center

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